PAIN & AGING SECTION

Original Research Article

Physical and Psychosocial Health in Older Women with Chronic Pain: Comparing Clusters of Clinical and Nonclinical Samples

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Abstract

Background. This investigation examined why some elderly women with severe pain symptoms and impairment in health status were not seen in a tertiary care pain center.

Methods. Three groups of older (≥60 years) women were included in the study: women seeking chronic pain treatment at a multidisciplinary pain center (N = 49), and research volunteers from the same institution with (N = 28) and without (N = 27) chronic pain. A clustering classification technique was used to identify clusters of older women with similar physical and mental health status.

Results. We found three clusters: 1) a healthy cluster (cluster 1: mostly nonclinical women); 2) a cluster with very poor physical and mental health status (cluster 3); and 3) a cluster with low physical health but average mental health (cluster 2). Although only cluster 1 had significantly higher physical health ($P < 0.001$), all three clusters had different mental health ($P < 0.001$). Within cluster 2, clinical women had more pain than nonclinical women, but within cluster 3, this was not so, indicating that mental health issues may create an obstacle to women having their pain appropriately assessed and treated.

Conclusions. Our findings support that while disability and pain severity contribute to specialized pain services usage among older women, there is a subgroup of people not receiving pain care for whom these pain symptoms are similar. Further studies are needed to assess the role of health-seeking behavior, coping preferences, referral patterns, and patient–physician communication on access to tertiary pain care for older women.

Key Words. Chronic Pain; Aging; Women; Health Status; Cluster Analysis; Health Care Access

Introduction

Chronic pain (i.e., nonmalignant or benign pain ≥3 months) is a major public health problem with nearly 100 million Americans affected [1]. There is evidence to support an increase in chronic pain's prevalence in an increasingly aging society and in women [2,3]. Most pain complaints (>70%) arise from the elderly. This population also consumes significantly more medications to treat pain symptoms than any other segment of the population [4,5]. They also suffer greater psychological and physical perturbations (e.g., depression, sleep disturbances) related to pain [2,6–9]. Additionally, chronic pain has significant socioeconomic implications for health care financing [10], resource availability, and utilization [11]. For older women, chronic pain also has many individual (e.g., social isolation), familial, and societal consequences [12]. Considering increased longevity, the growing elderly female population, and the higher prevalence of pain in both women [13] and elders [5], there is increasing concern regarding the impact that chronic pain will have on overall health and well-being in older women [12,14].

Multiple therapeutic modalities are available to alleviate pain and suffering, yet the quality of pain care (i.e., assessment and management) is extremely variable. Despite medical advancements yielding increased longevity as well as the documented benefits of multidisciplinary pain

care centers [15], few elders attend these pain centers [4,16]. Variability in the quality of pain care and utilization may be attributed to differences in pain severity, pain care perceptions [17], insurance coverage, physical access, and health care professional characteristics (e.g., attitudes, knowledge, and communication styles) [18–21]. Although older women enjoy greater longevity than men, they may be particularly vulnerable to decreased quality of life (QOL) due to chronic pain and suboptimal pain care. Yet, there are few studies focusing on the pain experience in older women. Despite strong evidence supporting subgroups of the chronic pain population based on clinical presentation using taxonomic methodologies such as cluster analysis [2,22,23], most studies focusing on aging and chronic pain failed to examine how variations in clinical presentations impact pain care or pain care utilization.

The literature provides evidence for variability in the chronic pain experience and in physician pain management decision making. We hypothesized, among clinical (i.e., receiving treatment in a pain center) and nonclinical older women with and without chronic pain, that clusters could be identified based upon their physical and mental health using the Medical Outcomes Survey Short Form 36. We further hypothesized their clinical status (i.e., whether they were receiving treatment at a pain center) depended upon their physical health (e.g., pain severity, sleep quality), mental health (e.g., depression), and pain perception. A cross-sectional survey study was designed to: 1) describe the chronic pain experience of older women with and without chronic pain in clinical and nonclinical settings; 2) identify clusters of older women with and without chronic pain based on their physical and psychosocial health; and 3) identify factors predicting older women with similar health status seeking specialty pain care by comparing between and within the identified clusters.

Methods

Participants and Recruitment

The University of Michigan Medical School's Institutional Review Board approved this prospective survey study examining chronic pain in older women (i.e., ≥60 years old). Forty-nine consecutive older women with chronic pain were recruited at the University of Michigan Multidisciplinary Pain Center (MPC). Fifty-five randomly selected older women who met age inclusion criteria were recruited via U.S. mail through the University of Michigan's Geriatric Center registry of research volunteers. Women recruited through the clinic were labeled "clinical women with chronic pain." Nonclinical volunteers fell into two categories based upon whether they were experiencing chronic pain: women with chronic pain were labeled "non-clinical women with chronic pain," while women without chronic pain were labeled "non-clinical women without pain." Informed consent was obtained and all data were collected by survey upon initial assessment at the MPC for clinical women and by U.S. mail for volunteers.

Measures

Sociodemographics

Clinical women with chronic pain (group A) provided self-report data using the Pain Assessment Inventory and Narrative (PAN) at initial assessment. The PAN is part of a standard clinical evaluation and includes sociodemographic characteristics: age, race, marital status, education, employment status, and stress-related comorbidities (high blood pressure, colitis, gastric ulcer, irritable bowel syndrome, or asthma). The nonclinical women (groups B and C) completed a shortened version of the PAN (focused on questions of interest to the current investigation) in the mailed survey.

The McGill Pain Questionnaire (MPQ) assessed pain. Twenty groups of descriptive words measure sensory, affective, evaluative, and miscellaneous pain [24]. Repeated administration revealed a 70.3% rate of consistency in the total Pain Rating Index score [25].

The Medical Outcomes Survey Short-Form (SF-36) is a well-validated measure of physical and mental health-related QOL. The SF-36 responses were computed to create eight subscores (general health, physical functioning, role-physical, bodily pain, mental health, role-emotional, social functioning, and vitality) and two global scores (physical component score [PCS] and mental component score MCS]). Age-specific norm-based scoring was as recommended [26] such that scale ranges would be comparable for planned analyses.

The 15-item Geriatric Depression Scale-Short Form (GDS-SF) screens for depressive symptoms. Affirmative responses were added for each subject (GDS-SF > 5 indicates significant depressive symptoms) with higher scores indicating more depressive symptoms [27]. The Beck Depression Inventory (BDI) is a 21-item screen for depression over a 2-week period.

The Pain Disability Index (PDI) is a 7-item self-report instrument measuring the degree pain interferes with functioning across seven domains: family/home, recreation, social activity, occupation, sexual behavior, self-care, and life support [28]. The sexual domain item was frequently skipped and, so, was dropped from analyses.

The 19-item Pittsburgh Sleep Quality Index (PSQI) measures subjective sleep quality. The PSQI is well validated in the elderly, yielding seven component scores (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication use, and daytime dysfunction) [29]. All the subscales were used in analyses.

Seven items from the American Pain Society Pain Outcomes Questionnaire (APS-POQ) assessed perceived barriers to pain treatment. These items showed good internal consistency ($\alpha = 0.72$) and week interval test–retest reliability ($r = 0.85$) [30].

Statistical Analysis

All statistical analyses were performed using SPSS 16.0® (SPSS Inc., Chicago, IL).

Descriptive statistics provided group demographics. Groups were then compared on health status (SF-36: MCS and PCS), depression (GDS), sleep quality (PSQI), and total comorbidities using analysis of covariance (ANCOVA) and multiple analysis of covariance (MANCOVA) based on clinical and chronic pain status (1 = clinical women with chronic pain [group A], 2 = nonclinical women with chronic pain [group B], and 3 = nonclinical women without chronic pain [group C]). Post hoc Bonferroni paired *t*-tests were used to specify paired group differences. The clinical women with chronic pain (group A) and nonclinical women with chronic pain (group B) were also compared on their responses to the MPQ, PDI, and APS-POQ using MANCOVA for each subset of questions (to control for additive error when the dependent variable had more than two subscales), controlling for the demographic variables found to be different between comparison groups.

Cluster Analysis

Given the relatively high prevalence of pain in this age group, we wanted to examine the physical and mental health profiles of the volunteer women (groups B and C) in conjunction with the clinical women (group A) to determine if there was a subset of volunteers who were "similar to the clinical sample" (group A) but who were not using specialty pain care. Based on recommendations by Clatworthy et al. [31], and because cluster analysis is typically not used with a population sampled in two different ways, we first used hierarchical cluster analysis. This provided squared Euclidian distances from the cluster means (a measure of fit). Ward's method was chosen as it minimizes within-cluster variation and tends to produce clusters of relatively similar size [32]. We then verified clusters using K-means iterative cluster analysis, justified because the goal was not to classify per se, but rather to explore whether, within the nonclinical group (groups B and C), there was a subgroup with a profile similar to those seeking care at the pain center and thus at risk for suboptimal pain care. The classification variables were the eight SF-36 subscales. Fusion coefficients and the dendogram resulting from hierarchical cluster analysis were used to determine the appropriate number of clusters. This number was then specified for the K-means analysis.

Between-Cluster and Within-Cluster Comparisons

ANCOVA and MANCOVA were repeated by cluster to determine whether cluster membership explained differences in health outcomes and to explore whether demographic, physical, and psychological differences may explain clinical presentation within the clusters.

Results

Sample Demographics

Participants were classified based upon where they were recruited (clinic or the registry) and the presence or absence of chronic pain. The overall response rate for the sample was 72%. The older women were predominantly white (96%), married or living with a significant other (62%), not employed (85%), and their ages ranged from 61 to 76 years. Forty-nine women were recruited at the clinic (group A). For groups B and C, the nonclinical women (N = 55), 28 did not have chronic pain (group C), while 27 had experienced chronic pain for at least 3 months (group B). The nonclinical groups (B and C) were more likely to have post-high school education than the clinical group (A) (86% vs 60%; Pearson $\chi^2 = 10.92$; $P = 0.03$). There were no other demographic differences between the groups. Assumptions of normality were tested through skewness, and BDI and affective MPQ pain had skewness scores greater than 1, and so, log-transformed variables were additionally used to verify findings. All other variables were normally distributed.

Physical and Psychosocial Health

Significant group differences were found for several variables (Table 1). ANCOVA was used for all measures, except sleep quality (assessed with MANCOVA due to the correlated subscales), controlling for education level. Group A had the lowest overall physical health via the PCS and reported more comorbid conditions. Group C had the best physical health ($P \leq 0.001$). Group A also had the poorest mental health via the mental component scale and Geriatric Depression Scale ($P \leq 0.001$). Sleep quality was generally worse for group A when compared with group C (i.e., women without pain; $P = 0.02$). In most cases, group B (i.e., nonclinical women with pain) did not differ from either group A or group C in sleep quality. Table 1 provides specific paired comparisons between the groups.

Pain Measure Characteristics Between Chronic Pain Samples (i.e., Groups A and B)

Group A had higher pain scores than group B as measured by the MPQ using MANCOVA, controlling for education as shown in Table 2. There were trend level differences overall ($P = 0.06$), and significant differences in affective, miscellaneous, and evaluative subscales ($P \leq 0.05$); sensory pain differed at trend level ($P = 0.07$). Groups A and B also differed on the PDI ($P = 0.02$) and all individual PDI measures except life support activities. The clinical (group A) and nonclinical women with chronic pain (group B) did not differ on pain treatment perceptions overall, although there were trend level differences ($P < 0.10$) on two individual items regarding pain medicine attitudes, where the clinical sample expressed more favorable views of pain medication.

Table 1 Differences in health (physical and mental) and health behaviors by clinical and chronic pain status, mean estimates adjusted for education

	Clinical Women with Chronic Pain Mean (SE) (Group A)	Nonclinical Women with Chronic Pain Mean (SE) (Group B)	Nonclinical Women Without Chronic Pain Mean (SE) (Group C)	Difference Statistic F (df)	P Value
N	49	27	28		
Mental health					
Mental component score (SF-36)	50.27 (3.12)[a]	65.64 (3.92)[b]	78.65 (4.01)[b]	14.79 (2,81)	**<0.01**
Geriatric Depression Scales	5.05 (0.47)[a]	2.86 (0.64)[b]	2.00 (0.64)[b]	8.22 (2,69)	**<0.01**
BDI	13.14 (1.62)[a]	7.64 (2.11)[a]	7.51 (1.83)[a]	3.08 (2,61)	**0.05**
Log-transformed BDI	2.36 (0.90)	1.97 (0.81)	1.701 (0.92)	1.18 (2,80)	0.31
Physical health					
Physical component score (SF-36)	28.91 (2.81)[a]	46.70 (3.51)[b]	75.00 (3.54)[c]	48.21 (2,62)	**<0.01**
Total number of stress-related comorbidities	1.29 (0.13)[a]	0.54 (0.17)[b]	0.61 (0.17)[b]	7.59 (2,83)	**<0.01**
Sleep quality (PSQI)*				22.25 (14,132)*	**0.03**
Subjective sleep quality	1.36 (0.15)	1.22 (0.15)	0.84 (0.16)	3.03	0.06
Sleep latency	1.43 (0.19)	0.80 (0.20)	0.93 (0.21)	2.81	0.07
Sleep duration	1.34 (0.19)	1.06 (0.20)	0.86 (0.21)	1.41	0.25
Habitual sleep efficiency	1.29 (0.21)[a]	1.03 (0.22)[ab]	0.43 (0.23)[b]	3.75	**0.03**
Sleep disturbances	1.74 (0.11)[a]	1.61 (0.12)[ab]	1.26 (0.12)[b]	4.30	**0.02**
Use of sleep medication	1.40 (0.25)[a]	1.25 (0.26)[ab]	0.45 (0.27)[b]	3.74	**0.03**
Daytime dysfunction	1.45 (0.14)[a]	1.16 (0.15)[b]	0.61 (0.15)[c]	8.45	**0.001**
PSQI total	10.42 (0.73)[a]	7.90 (0.80)[ab]	5.28 (0.87)[b]		
(% of group meeting disordered sleep criteria)	(89)	(81)	(45)		

Note: [abc] Identical letters are not different from each other; different letters denote differences $P < 0.05$. Bold denotes significance.
* Multivariate analysis of covariance was used for the components of PSQI; the corresponding difference statistic is Wilkes lambda, rather than the F statistic used for individual measure differences and for the univariate differences among items.
BDI = Beck Depression Inventory; df = degrees of freedom; PSQI = Pittsburgh Sleep Quality Index; SE = standard error; SF-36 = Medical Outcomes Survey Short-Form.

Clusters Identified

Using the eight SF-36 subscales, three clusters were found to be optimal using Ward's method hierarchical cluster analysis (and the corresponding dendogram) and the fusion coefficients generated in the agglomeration. Two cases did not have enough responses to be classified. Cluster membership was as follows: cluster 1—high physical functioning and high mental functioning (N = 31); cluster 2—low physical functioning but high mental functioning (N = 36); and cluster 3—low physical functioning and low mental functioning (N = 35).

K-means cluster analysis verified a three-cluster solution. Three additional cases could not be classified as the K-means method tolerates no missing data. Clusters were approximately equal in size (N$_I$ = 31, N$_{II}$ = 34, N$_{III}$ = 34). Although the two methods found groups split in the same manner, six cases were in different clusters using the different methods. The cases that differed between methods tended to fit chronic pain criteria but at a low level of pain (clinical [N = 3]; nonclinical [N = 1]) or have a unique mix of QOL variables (N = 2). These cases (N = 6) were dropped from further analyses. Final cluster designation by group is shown in Table 3. Figure 1 displays

Table 2 Pain characteristics, disability, and perception comparisons among older women with chronic pain; estimated mean, controlling for education, age, and comorbidities

	Clinical Women with Chronic Pain Mean (SE) (Group A)	Nonclinical Women with Chronic Pain Mean (SE) (Group B)	Difference Statistic* F (df)	P Value
Pain characteristics				
MPQ	—	—	2.39 (4,51)	0.06
Affective PRI	2.72 (0.36)	1.33 (0.47)	5.26	**0.03**
Log-transformed affective PRI	1.06 (0.11)	0.87 (0.18)	0.68	0.42
Sensory PRI	15.314 (1.27)	11.31 (2.05)	2.40	0.13
Evaluative	3.46 (0.21)	2.51 (0.34)	4.92	**0.03**
Miscellaneous	5.58 (0.53)	2.46 (0.86)	8.29	**<0.01**
PDI				
Total score			2.92	**0.02**
Family/home responsibilities	6.23 (0.48)	3.71 (0.62)	9.79	**<0.01**
Recreational activities	6.15 (0.57)	4.04 (0.74)	4.37	**0.04**
Social activities	5.23 (0.48)	2.42 (0.62)	12.06	**<0.01**
Occupational activities	6.24 (0.49)	3.35 (0.64)	11.96	**<0.01**
Self-care activities	3.55 (0.49)	1.53 (0.63)	5.94	**0.02**
Life support activities	2.32 (0.42)	1.27 (0.55)	2.24	0.14
Pain perceptions				
APS-POQ	—	—	1.10	0.38
People can get addicted to medication easily.	2.54 (0.24)	3.25 (0.32)	2.99	0.09
Complaints distract physician.	1.44 (0.25)	1.32 (0.33)	0.07	0.80
Good patients avoid talking about pain.	1.51 (0.23)	2.01 (0.31)	2.19	0.14
Pain medicine cannot really control pain.	2.86 (0.25)	2.70 (0.33)	0.14	0.71
Pain medicine should be "saved" in case pain gets worse.	0.99 (0.23)	1.74 (0.31)	3.58	0.06
Easier to put up with pain than side effects of medicine.	2.06 (0.26)	2.58 (0.35)	1.35	0.25
Experience of pain means illness has gotten worse.	2.37 (0.27)	2.63 (0.37)	0.30	0.59

Note: Sample comparisons account for education, and cluster comparisons account for age and education, which were found to be different by group. Bold denotes significance.
* Wilkes lambda is the statistic used for MANCOVA; the F statistic is used for univariate comparisons. MANCOVA was used for MPQ, PDI, and APS-POQ; analysis of covariance for WHYMPI.
APS-POQ = American Pain Society Pain Outcomes Questionnaire; df = degrees of freedom; MANCOVA = multiple analysis of covariance; MPQ = McGill Pain Questionnaire; PDI = Pain Disability Index; PRI = Pain Rating Index; WHYMPI = West Haven-Yale Multidimensional Pain Inventory.

where individuals from the three clusters fell on the physical and MCSs of the SF-36. The women in cluster 2 were significantly older than cluster 3 women (70 vs 66 years, $P = 0.05$). Cluster 1 had more education than the other clusters.

Physical and Psychosocial Health by Cluster Membership

Table 4 details cluster differences. For most physical health variables, only cluster 1 is different, having better physical health. All clusters were different on most mental health measures.

Within-Cluster Comparison of Clinical and Nonclinical Women with Chronic Pain

As cluster 1 included mostly group C (72% without chronic pain and 0% clinical women), "within cluster comparisons" were limited to clusters 2 and 3. Comparisons of clinical and nonclinical women by cluster can be seen in Table 5. Clinical women (group A) had more

Table 3 Cluster designation by group membership

	Clinical Women with Chronic Pain (Group A)	Nonclinical Women with Chronic Pain (Group B)	Nonclinical Women Without Chronic Pain (Group C)	Total
Cluster 1—high mental and physical functioning	0	8	21	29
Cluster 2—high mental and low physical functioning	22	9	2	33
Cluster 3—low mental and physical functioning	22	9	3	34
Could not classify	5	1	2	8
Total	49	27	28	104

comorbidities in both cases (cluster 2: 3.00 vs 0.46, $P = 0.01$; cluster 3: 3.88 vs 2.12, $P = 0.05$). There were no differences in depression and only a single sleep item difference; clinical women in cluster 3 taking longer to fall asleep than nonclinical women. Likewise, there was only a single item difference in attitudes regarding pain care. Clinical women had individual scale differences in the MPQ (see Table 5) and higher pain in each case. Only among cluster 2 did clinical women have more pain overall based on the multivariate F ($F = 2.82$, $P = 0.05$), although cluster 3 did have individual measures where clinical women had more symptoms. Likewise, clinical women in cluster 2 had higher disability than nonclinical women. There were no differences in disability between clinical and nonclinical women in cluster 3. To test the overall case by cluster analysis, 2×2 MANCOVA and ANCOVAs were run on variables in Table 5, and only case, or clinical status, was significant, not cluster or interaction, though the disability interaction approached significance ($P = 0.07$).

Discussion

Disparities in health due to chronic pain and disparities in pain care may have a devastating effect on older women's functional abilities and successful aging. The current investigation describes the chronic pain experience in older women with and without chronic pain. When we identified three clusters of older women with similar physical and mental profiles drawing from both a clinical and nonclinical sample, we identified a subgroup of older women in the community with severe chronic pain symptoms and consequences who are not receiving specialized pain care. Thus, the appropriate assessment and treatment of this subgroup of older women with severe chronic pain may yield significant health benefits for the individual and the society. To our knowledge, this is the first study to compare older women with and without chronic pain and to compare those who are and are not receiving specialty chronic pain care.
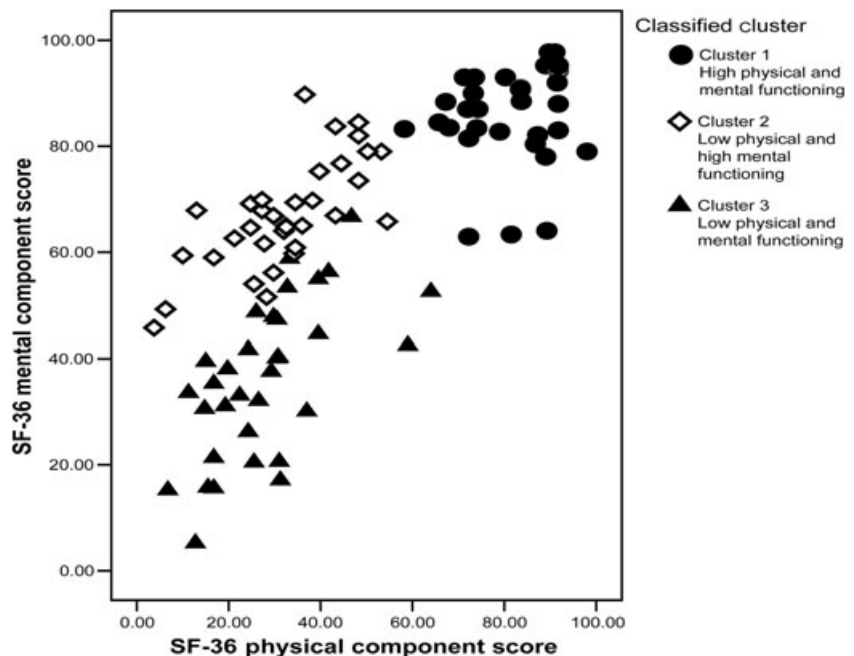

Figure 1 Older women's physical and mental health scores by cluster membership. SF-36 = Medical Outcomes Survey Short-Form.

Table 4 Differences in physical health, mental health, and health behaviors among clusters; mean estimates (SE) and difference values

	Cluster 1—High Mental and Physical Functioning Mean (SE)	Cluster 2—High Mental and Low Physical Functioning Mean (SE)	Cluster 3—Low Mental and Physical Functioning Mean (SE)	Difference Statistic F	P Value
Mental health					
Mental component score (SF-36)	85.17 (2.17)[a]	66.64 (1.98)[b]	34.68 (2.00)[c]	151.09	**<0.01**
Geriatric Depression Scales	1.48 (0.52)[a]	3.47 (0.50)[b]	6.14 (0.49)[c]	21.61	**<0.01**
Beck Depression Inventory	5.95 (1.59)[a]	7.37 (1.88)[a]	17.36 (1.65)[b]	13.91	**<0.01**
Physical health					
Physical component score (SF-36)	80.66 (2.19)[a]	32.20 (2.07)[b]	27.99 (2.03)[b]	175.60	**<0.01**
Total number of stress-related comorbidities	1.07 (0.17)	0.98 (0.16)	0.61 (0.18)	1.96	0.15
Sleep quality (PSQI)					
Subjective sleep quality	0.80 (0.14)[a]	1.14 (0.13)[a]	1.73 (0.14)[b]	11.40	**<0.01**
Sleep latency	0.66 (0.17)[a]	1.14 (0.16)[a]	1.72 (0.17)[b]	9.49	**<0.01**
Sleep duration	0.86 (0.18)[a]	0.98 (0.17)[a]	1.62 (0.18)[b]	5.16	**<0.01**
Habitual sleep efficiency	0.48 (0.20)[a]	0.99 (0.19)[ab]	1.49 (0.20)[b]	6.13	**<0.01**
Sleep disturbances	1.28 (0.11)[a]	1.61 (0.10)[a]	1.96 (0.10)[b]	10.52	**<0.01**
Use of sleep medication	0.65 (0.25)[a]	1.15 (0.24)[ab]	1.64 (0.25)[b]	3.87	**0.03**
Daytime dysfunction	0.58 (0.13)[a]	1.26 (0.12)[b]	1.56 (0.13)[b]	14.76	**<0.01**
PSQI total	5.24 (0.754)[a]	7.96 (0.76)[b]	11.52 (0.77)[c]		
(% with disordered sleep)	(55)	(74)	(96)		
Pain variables*					
West Haven-Yale Multidisciplinary Pain Index	1.53 (0.32)[a]	2.99 (0.21)[b]	3.00 (0.22)[b]	8.46	**<0.01**
McGill Pain Inventory				24.53	**<0.01**
Sensory pain	8.92 (1.77)[a]	12.54 (1.32)[ab]	14.94 (1.37)[b]	3.55	**0.03**
Affective pain	0.87 (0.53)[a]	1.73 (0.40)[ab]	2.93 (0.41)[b]	5.01	**<0.01**
Evaluative pain	1.84 (0.32)[a]	2.97 (0.24)[b]	3.20 (0.25)[b]	5.86	**<0.01**
Miscellaneous pain	2.00 (0.82)[a]	4.32 (0.61)[ab]	4.72 (0.63)[b]	3.65	**0.03**
Pain Disability Index	5.37 (2.66)[a]	29.66 (3.30)[b]	30.45 (2.97)[b]	24.53	**<0.01**

Note: [abc] Like letters are not different from each other; different letters denote differences $P < 0.05$. Bold denotes significance.
* Pain variables were only reported by 15 people in cluster 1 because the other people reported no pain at all. This minimized group differences.
PSQI = Pittsburgh Sleep Quality Index; SE = standard error; SF-36 = Medical Outcomes Survey Short-Form.

Table 5 Within-cluster comparison of clinical and nonclinical older women with chronic pain after controlling for age and education

	Cluster 2 (High Mental and Low Physical Functioning)			Cluster 3 (Low Mental and Physical Functioning)		
	Clinical Mean (SE)	Nonclinical Mean (SE)	P Value	Clinical Mean (SE)	Nonclinical Mean (SE)	P Value
N	17	9		14	9	
Pain characteristics						
MPQ*	—	—	0.12	—	—	0.11
Sensory PRI	13.99 (1.68)	7.58 (2.41)	0.05	17.25 (2.16)	11.94 (2.70)	0.14
Affective PRI	1.58 (0.58)	1.35 (0.83)	0.83	4.00 (0.679)	1.66 (0.84)	**0.04**
Evaluative	3.19 (0.37)	2.53 (0.53)	0.35	3.66 (0.22)	2.64 (0.27)	**0.01**
Miscellaneous	5.80 (0.83)	1.27 (1.19)	0.007	6.10 (0.83)	3.62 (1.04)	0.07
PDI						
Total score†	39.70 (3.54)	21.82 (5.32)	0.02	35.18 (3.65)	27.33 (4.67)	0.21
Pain perceptions						
APS-POQ*	—	—	0.25	—	—	0.82
People can get addicted to medication easily.	2.47 (0.36)	3.66 (0.55)	0.11	2.63 (0.38)	3.20 (0.51)	0.40
Complaints distract physician.	1.30 (0.42)	1.09 (0.63)	0.80	1.50 (0.40)	2.00 (0.53)	0.47
Good patients avoid talking about pain.	1.48 (0.39)	2.54 (0.59)	0.18	1.38 (0.39)	2.54 (0.52)	0.10
Pain medicine cannot really control pain.	2.81 (0.38)	2.69 (0.58)	0.88	2.87 (0.38)	2.72 (0.50)	0.81
Pain medicine should be "saved" in case pain gets worse.	0.55 (0.33)	2.40 (0.49)	0.01	1.27 (0.27)	1.46 (0.48)	0.77
Easier to put up with pain than side effects of medicine.	1.66 (0.39)	2.88 (0.59)	0.12	2.13 (0.41)	2.78 (0.54)	0.36
Experience of pain means illness has gotten worse.	2.23 (0.40)	2.85 (0.60)	0.43	2.87 (0.45)	3.22 (0.59)	0.65

Note: Sample comparisons account for education, and cluster comparisons account for age and education, which were found to be different by group. Bold denotes significance.
* Multivariate analysis of covariance was used for MPQ and APS-POQ; ANCOVA for PDI.
† PDI is a weighted sum (allowing for missing values) of at least five of the seven PDI variables; ANCOVA controls for education.
APS-POQ = American Pain Society Pain Outcomes Questionnaire; ANCOVA = analysis of covariance; MPQ = McGill Pain Questionnaire; PDI = Pain Disability Index; PRI = Pain Rating Index; SE = standard error.

The current investigation used an innovative classification method to identify groups of older women with similar physical and mental health. Most studies using clustering techniques to classify chronic pain patients used physical and mental health as well as pain severity measures [2,22]. In this study, older women with and without chronic pain were classified based on their physical and mental health via SF-36 to determine their functioning profiles. We were able to identify three clusters: "low physical and mental health" (cluster 3), "good physical and mental health" (cluster 1), and "low physical health with high mental health" (cluster 2) in older women.

Overall, older women with chronic pain receiving specialty pain care had the poorest physical and mental health. The nonclinical without chronic pain reported the best health status, confirming the negative impact that chronic pain has on overall health, well-being, and QOL in older women. There was a high overall prevalence of sleep disturbances and comorbid conditions, although it was higher in clinical women than in those without chronic pain. However, on most sleep measures, the nonclinical women did not differ from the clinical women or the women without pain. The clinical women reported higher pain and greater disability than nonclinical women with chronic pain, but their attitudes did not vary except those related to pain medication.

Clustering added to the ability to differentiate older women by symptoms. While clinical and pain status typically only distinguished clinical vs not clinical, clustering provided groups of higher and lower physical health, and high, medium, and low mental health. The clinical group all fell in poor physical functioning groups but were split evenly by those who had poor and much better mental functioning. The nonclinical group with chronic pain fell equally across all three clusters, suggesting that there are different profiles for people in the community who are living with pain. Furthermore, these older women may benefit from specialty pain care. The nonchronic pain group fell almost exclusively into the high-functioning group. It is plausible that the rare older women in this group without chronic pain but with poor physical and mental functioning probably have an alternate illness or disability.

Overall, chronic pain did not differ by clinical status within clusters, but each cluster is differentiated by different pain measures. In the high mentally functioning cluster, pain severity and disability predict clinical status. In the poorly functioning cluster, emotional and evaluative pain better predict status. Chronic pain and pain-related disability result in increased health care utilization (primary care services, emergency department, and specialty services) [33]. Aliyu et al. reported that impairment in activities of daily living was associated with increased hospitalization [34]. We provide additional evidence that pain-related disability (as seen in cluster 2) corresponds with specialty health care service use. The results for cluster 3 suggest that older women seen at tertiary care pain clinics have a greater emotional component to their pain. In addition, this may also indicate that there is a subgroup of older women

being referred for emotional reasons and perhaps another subgroup who may benefit from (but are not currently receiving) specialty pain care. Differences in specialty pain care use may be due to coping style, financial and physical factors, patients' perception of health care, and physicians' perception of patients' mental health issues [18]. Consistent with the literature, variability in use of services was found. Twenty-six percent of the women in cluster 3 were not referred to a pain center despite similar pain characteristics, physical and mental health, and attitudes regarding pain as the clinical women. This variability could be explained by both health care provider and patient factors [21,35,36]. There were limited differences in pain care perception in the nonclinical sample. Future studies should elucidate the role of coping strategies, self-efficacy, and physician variability on utilization of specialized pain care in older women [37].

Despite our many significant findings, there are limitations. First, the small sample size and the underrepresentation of minority women limit generalizability. Second, the cross-sectional study design prevents conclusions regarding the directionality of the associations. Although insurance status and other health care services were not assessed, most (82%) women were eligible for Medicare, and this distribution did not differ based upon clinical status or cluster membership. It is also possible that some women were receiving pain care in the primary care arena. Finally, as a convenience sample from different settings was used, there is the potential for a selection bias. The role of patient preferences in health care seeking also remains unclear. Nonetheless, we have generated further hypotheses on specialty pain care use while proposing potential determinants for limited specialty pain use among older women.

This study uses a classification method to identify groups of older women with similar physical and mental health status. We confirm the existence of a healthy cluster (mostly nonclinical), a cluster with very poor health status, and a cluster with low physical health but average mental health. Beyond demonstrating decreased physical and mental functioning, this study is the first to demonstrate that among older women with pain-related disability, sensory pain may be a better determinant for receiving specialty pain care when functioning is also high. Our findings suggest that mental health symptoms are associated with less predictable specialized pain care services use for a subgroup of older women with very poor health status, despite severe pain and physical symptoms. This study provides important insights into barriers to successful aging and specialty pain care use while identifying areas for future research addressing variations in the chronic pain experience for older women.

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